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Description

The application relates to noise protection, such as a noise barrier for positioning next to a road or railway and to a method for producing said barrier.

Technical Field

The invention relates primarily to noise protection means of a kind that are intended for use on railways and roads where the environmental requirements stipulate a lower noise level than that which previously disclosed constructions were able to achieve, and without these affecting the surrounding environment and aesthetic considerations, in addition to which the construction itself shall withstand the effects of the weather in variable climatic zones. The noise protection comprises a sound-absorbent material produced from rubber granulate that is bonded together with the help of a bonding agent.

Description of the Prior Art

Previously disclosed are a variety of ways of compressing or moulding rubber waste, either alone or in conjunction with other products, to form porous material for acoustical and vibration damping or insulating purposes.

The noise protection in accordance with the present application is a further development of the product in accordance with the Swedish Patent Application with reference number 9700799-1 and with publication number SE, C2, 513102. This describes a noise barrier made of rubber waste mixed with a bonding agent, which bonding agent remains soft even after cold curing. The document does not describe any special arrangements or constructions for adaptation in accordance with climatic and environmental conditions.

Description of the Present Invention

An aim of the invention is to provide a reliable means of attachment of a sound-absorbing unit in a framework.

In a first embodiment of the present invention, the noise protection comprises a sound absorbent that is produced from a rubber granulate which is bonded together with the help of a bonding agent and a framework that is produced from a material that is harder than the material in the sound absorbent. The framework is fully or partially covered with the sound absorbent on the side that is intended to face towards the source of the sound. Specifically the framework is made of concrete and constitutes part of a free-standing element which exhibits a sole for placing on the ground or equivalent, from which there extends a portion projecting upwards in relation to the sole, and the sound absorbent is arranged at least on the upward-projecting portion. The upward-projecting portion is inclined in relation to the sole, and the sound absorbent is arranged between the sole and the under side of the inclined portion. The upward-projecting portion exhibits an upper portion which

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extends in parallel with the sole, and the sound absorbent is arranged on the under side of the upper portion. The noise protection is intended for positioning next to a road or railway.

The rubber protection comprises a sound-reflecting framework and a sound absorbent produced from rubber granulate, e.g. vehicle tyre granulate mixed with a bonding agent, whereby the framework comprises an upper portion, a sole portion and a back portion to which the sound absorbent is applied so that the sound absorbent is enclosed by the upper portion, the back portion and the sole portion and has one side intended to face towards the source of the sound on the road or the railway. The noise protection can preferably have a sole portion with an upper surface which, when the sole portion is standing on a horizontal surface, exhibits an inclination away from the back portion in the direction of the road or the railway in order to permit any liquid to drain away. For example, the upper portion has an upper surface that is convexly rounded to prevent the accumulation of liquid and dirt.

Brief Description of the Figures

From this point onwards in the running text, reference is made to the accompanying Figures for a better understanding of the embodiment and the given examples, in conjunction with which:

Figure 1 shows a cross-section of a noise barrier with a screen for advertising or similar and mesh protection.

Figure 2 shows a cross-section of an embodiment of a noise barrier in accordance with the present invention.

Figure 3 shows a cross-section of an embodiment of a noise barrier in accordance with the present invention placed on a finer macadam on a roadbed of coarse macadam.

Detailed Description of the Present Invention

The invention relates to a noise barrier, a development thereof, whereby disturbing sound levels shall effectively be reduced at points where the technology can best be adapted.

The invention also relates to a method for the production of a noise barrier.

The noise protection in accordance with the invention includes a sound absorbent made of rubber granulate from vehicle tyres, which is bonded together using a bonding agent, which mixture can be moulded into and enclosed by a supporting framework made of concrete, for example. The characteristic features of the invention can be appreciated from the accompanying Patent Claims. It is noted that the sound absorbent is made from rubber granulate in pieces of 0-15 cm in size.

In a suitable method, the rubber mass is poured onto a plate with means for securing the rubber to the plate. Before pouring the rubber, a mesh is placed on the mould plate. This mesh projects outwards by approximately 50 mm on the long sides. The solidified

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rubber mass, which forms the sound-absorbent unit, is placed together with the mesh in the concrete. In this way, the concrete penetrates partially into the sound-absorbent unit. Reinforcement is preferably provided in the concrete. The mould is closed and filled with self-compacting concrete. The projecting mesh is moulded securely in its upper and lower edges to the upper portion and the sole portion, respectively, of the framework in this way and as such provides a dependable assurance that the rubber will remain in the block.

The production method provides very effective attachment of the rubber. A very uneven rear side is also obtained, which further improves the acoustic properties of the block. There is no smooth surface against which the sound can rebound.

The invention is described in greater detail with reference to, for example, Figure 1, which illustrates the principles of a noise barrier intended for use along railways and roads.

A framework 10 is made of concrete and/or some other heavy material and partially encloses a sound absorbent 20 produced from rubber granulate. The sound-absorbing unit is moulded into the concrete mass 10. The framework 10 comprises a sole 11, from which an upward-projecting portion 12 extends at an angle to the sole 11, and at the upper portion of which an upper portion 13 extends parallel with the sole 11. The sound absorbent 20 is arranged on the under side of the inclined portion 12 and the upper portion 13 and extends along the top side of the sole 11.

The back portion 10 can be provided with advertisements and information signs, or alternatively a reflecting screen in the form of a receiver, onto which a transmitter positioned a short distance from the block can transmit a still or moving image about the advertisement or information. Also illustrated in Figure 1 is the screen 33, which is described above and can consist of a transparent material, homogeneous material or different types of mesh. The screen can be supplemented with barbed wire in order to make access to the other side difficult. The screen can be provided with advertisements, information signs or alternatively a reflecting screen in the form of a receiver, onto which a transmitter positioned a short distance from the block can transmit a still or moving image 33 for advertising and information. The framework 10 can also be formed with a drainage lip 37.

The side of the framework which is intended to face the noise source has attached to it a projecting mesh 36, which is moulded in place at its upper and lower edges to the upper and sole portions to form a secure attachment so that the rubber is caused to remain in the block and is not able to work loose towards the noise source. Several noise barriers are intended to be placed side by side along the road or railroad. A sealing strip 38, e.g. made of rubber or a rubber like material, can then be arranged between two adjacent noise barriers. The sealing strip 38 is rectangular in Figure 1 and extends from the sole portion 11 to the upper portion 13.

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Figure 2 shows a cross-section of an embodiment of the present invention, in which the sole portion 11 exhibits an inclination so that water can drain away and does not therefore accumulate.

The sound absorbent 20, which has been moulded into the framework 12, exhibits a cavity which permits a certain amount of water to run through. The upper surface 14 of the sole portion 11 has an inclination away from the upward-projecting portion, the back portion 12, so that, when the lower surface 15 of the sole portion bears flat and horizontally on a base, natural drainage of any water is obtained in a direction from the back portion 12 towards the noise source, e.g. in the direction of the railway track/carriageway. Ice formation is prevented by the running water, and at the same time a certain self-cleaning effect is achieved because rain water carries dirt with it and runs off the sole portion. The upper portion 13 has an upper surface 16 which is convexly rounded and prevents the accumulation of water and dirt on the upper portion. This is also an advantage when the noise protection is washed down during cleaning because the water runs off both the sole portion and the upper portion without requiring to be scraped or wiped off.

A mesh 36 is moulded into the upper portion 13 and the sole portion 11 adjacent the sound absorbent in front of the side intended to face the road or railroad.

Figure 3 shows an arrangement for an embodiment of the present invention adapted for noise damping next to a railway. Railways normally have a roadbed of coarse macadam 30, on which the rails are placed. In conjunction with the use of noise screens, which are stood directly on this coarse macadam, noise can leak through the macadam under the noise screen. In order to counteract this noise leakage, the noise screen can be supplemented with a bed of finer gravel or crushed macadam 32. The macadam under the noise protection is excavated to form a small trench, in which is laid a mat 31, for example made of geotextile, after which the trench is filled with a finer gravel 32. The noise screen is then placed on the gravel. Other water-permeable materials can also be used as a barrier between the coarser and the finer macadam. Figure 3 shows an arrangement for a noise barrier 10 next to a railway comprising a noise screen, with a framework 12 and a sound absorbent 20, which stands on a base of finer crushed macadam 32 segregated from the coarser macadam 30 of the roadbed by means of a mat 31. The mat prevents the finer gravel 32 from sinking down through the coarser gravel 30. By using a finer gravel, greater damping and absorption of noise under the noise screen is achieved. The mat allows water to pass through in the event of rain and during cleaning operations, but prevents the finer gravel from being washed away or from permeating down into the coarser macadam. In this way, the finer gravel or sand is prevented from permeating down into the roadbed and retaining water, which, as the water freezes, is associated with the risk of subsidence in the roadbed and track dislocations. A mesh 36 is partly moulded into an upper portion 13 and a sole portion 11.

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Above the framework 10 can be raised a screen consisting of transparent material, homogeneous material or different types of mesh. The raised screen can be supplemented with barbed wire in order to make access to the other side difficult. The screen can also be provided with advertising, information signs or alternatively a reflecting screen in the form of a receiver, onto which a transmitter positioned a short distance from the block can transmit a still or moving image for advertising or information.

In accordance with the present invention, a method for producing a noise barrier intended for placing next to a road or a railway next to the noise protection, involves first pouring a rubber mass onto a plate with means for securing the rubber to the plate. A mesh is placed on the mould plate before pouring the rubber. This projects by approximately 50 mm on the long sides. A plate and rubber are placed in the concrete mould. Reinforcement is installed in the mould. The mould is closed and self-compacting concrete is poured in. The characterizing feature is that the sound absorbent is partially moulded into the framework in this way. The technical dimensions can, for example, be as listed below.

Technical Data

Length	3,500 mm
Height	1,000 mm
Width (bottom)	700 mm

alternatively 1,300 mm if supplemented with a screen over 1,000 mm Plexiglas 15 mm).

Weight including adhesive and tyre granulate approximately 2,425 kg (bottom 700 mm) alternatively 3,100 kg (bottom 1,300 mm).

Concrete	K 40. Watertight and frost resistant
Rubber	Ground vehicle tyres (approximately 400 kg)
Adhesive	Special single-component (40-50 kg/block)

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